CCHFVacim

Crimean Congo Haemorrhagic Fever (CCHF) is a serious, often fatal viral disease transmitted by ticks. There have been severe outbreaks in Africa and Asia for decades, with up to 40% of patients dying.

The **CCHF Virus (CCHFV)** is spreading in Europe. The first deaths from CCHFV have been reported in Spain and Portugal. There are currently no approved prophylactic or therapeutic treatments. The CCHF Vaccine and Immunotherapy (CCHFVACIM) project builds on previous EU-funded initiatives CCHFever and CCHFVaccine. It will apply innovative mRNA-based strategies to develop vaccines for prevention, and monoclonal antibodies for "immunotherapeutic" treatment for this deadly disease.

OBJECTIVES

The CCHFVACIM project aims to develop an mRNA vaccine and immunotherapy strategies against Crimean Congo Hemorrhagic Fever (CCHF), and to prepare for clinical trials. Six specific objectives guide the project:

Characterize Surface Glycoproteins: It's still unclear what would be the best target for vaccines and monoclonal antibodies.
To address this, we will define the structure of CCHFV's surface glycoprotein complex and identify protective epitopes.

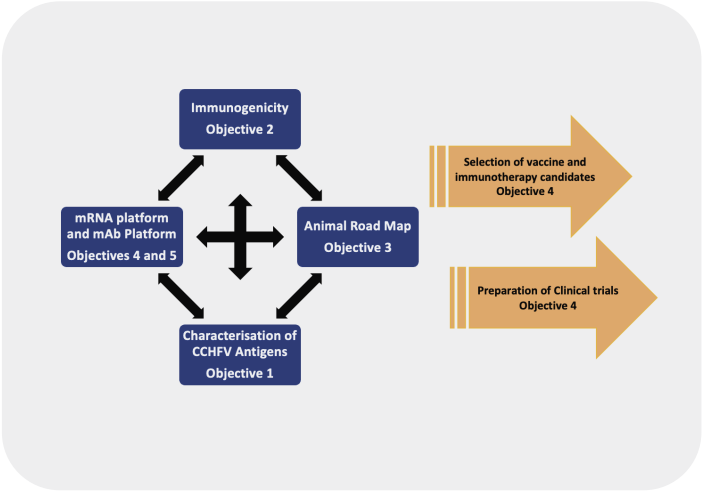
Investigate Vaccine Immunogenicity: Having a target is not enough; it needs to provoke an immune reaction. We will assess the immunogenicity of mRNA vaccine candidates and optimize immune responses.

Utilize Animal Models in a meaningful manner: Working with CCHFV requires the most stringent biosafety and biosecurity conditions, making experimental work, especially with animals extremely demanding. We will develop, refine and validate animal models so that they can be used for vaccine and immunotherapy research in the most humane and efficient manner.

Design mRNA Vaccine: The knowledge gained from the structural and immunogenicity studies will be converted into candidate solutions. We will create and prepare mRNA vaccines for clinical trials.

Develop Immunotherapies: The same new knowledge will alllow us to produce monoclonal antibodies (mAbs) and mRNA-based mAbs for treating CCHF.

Disseminate Results: Finally, it's vital that our discoveries be broadcast widely so that this publicly-funded programme has a maximum benefit. We will share our findings with scientific, public health, and international communities, and establish exploitation plans to turn our work into real world solutions.



CCHFVACIM AT A GLANCE

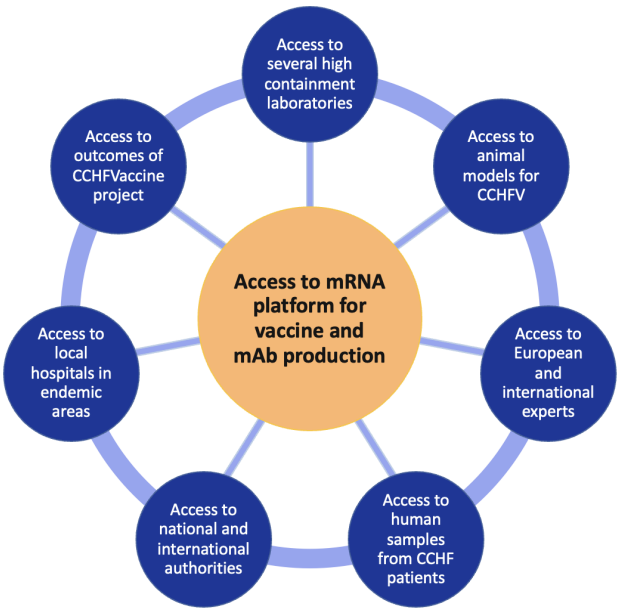
The CCHFVACIM project has assembled a world-class consortium to tackle the ambitious goal of developing vaccines and immunotherapies against Crimean-Congo Hemorrhagic Fever Virus (CCHFV). This 15-partner team brings together unique expertise across multiple disciplines, from deep structural biology to vaccine optimization, to ensure a comprehensive approach to tackling this pressing health issue.

The project faces significant challenges. Producing and characterizing viral glycoproteins is technically demanding, as is unravelling the immunogenicity of viral antigens and immune responses triggered by pathogens and vaccines. Moreover, while mRNA platforms offer promise as a foundation for vaccines, their design and production are still in their relative infancy. Conducting essential in vivo studies under maximum containment conditions introduces further logistical and practical difficulties.

To address these issues, the CCHFVACIM consortium has secured experts with proven capabilities in all the relevant areas, virologists with long experience of working with CCHFV in the safest and most secure labs, structural biologists, immunologists, and proficient vaccine developers, collaborating with the goal of creating a robust and safe vaccine.

In short, by combining deep scientific expertise with state-of-the-art facilities, CCHFVACIM is uniquely positioned to overcome these obstacles and develop groundbreaking medical countermeasures against CCHFV.

CCHFVACIM builds on several key element for achieving its goals.



The CCHFVACIM project will launch a unique One-Health strategy to tackle this public health threat. It will use advanced animal models to evaluate mRNA vaccines, monoclonal antibodies, and therapeutic mRNA in mice, sheep, and non-human primates.

The project will also strengthen European infrastructure and create a roadmap to advance the best vaccine candidates and immunotherapies to Phase I human trials. Collaborating with the Serum Institute and ICMR in India, it will support mRNA-LNP production and a clinical trial in India. Results will be shared widely with public health bodies, NGOs, outbreak teams, and hospitals in affected regions.

PROJECT'S SIGNIFICANCE

CCHF virus is a neglected zoonotic pathogen, **one of the most medically significant transmitted from wild animals and livestock to humans by ticks**. It already has a very broad geographical spread, and is endemic in many parts of Africa and Asia, as well as the Balkans.

With climate change, the virus's vector, the tick Hyalomma m. marginatum, which can be carried by birds, continues to spread north, from Africa into Spain, Portugal, France and Germany, even reaching England and Sweden.

This raises the possibility of outbreaks across Western Europe.

Despite this threat, there are neither a vaccine nor treatments available to protect humans or eliminate the virus from animal populations.

By bringing together **scientists from human and veterinary medicine**, with a common goal and unified One Health approach, the CCHFVACIM project will address the bottlenecks related to immunotherapy and vaccine development.

Uncovering CCHFV's most important antigens will be a vital step in the development of efficient countermeasures against CCHF, not only by our consortium, but also the rest of the CCHF research community.

Similarly, the characterisation of the protective immunity stimulated by vaccination in animal models, and of the adaptive immunity triggered by natural CCHFV infection in humans, will provide invaluable insight into the host-pathogen interactions of CCHFV.

All this knowledge will lead to the development and delivery of several vaccine candidates ready for clinical evaluation, as well as new immunological therapeutic strategies to control CCHF on a global level.

Considering the lack of R&D so far on CCHFV and CCHF disease, achieving all the objectives of the CCHFVACIM project will undoubtedly have a major impact in the field. It would provide crucial knowledge on the pathogen, as well as candidate countermeasures for fighting the spread of this deadly disease.

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IERO

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ERINHA

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